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Movement of Offshore Lobster (Homarus americanus)  
Displaced to Coastal Areas of Nova Scotia

by

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## ABSTRACT

A total of 401 berried female lobsters were displaced from Georges Bank to three coastal locations along Nova Scotia's southwestern shore. Of the total released, 68 (17%) were recaptured, and 66 of these had moved offshore in the direction of original capture and were caught >117 km from release sites. Mean days at large was 492 and the greatest time at liberty 1526 days. The mean distance travelled was 144 km. The greatest straight-line distance was 216 km, recorded for a 118 mm lobster which travelled from Port Mouton Island to the outer Continental shelf west of Browns Bank in 390 days. Of the 68 recaptured lobsters, 9 (13%) were recaptured a second time. Results of this ongoing study indicate that displaced offshore lobsters exhibited a directed movement toward the area of original capture. Further tagging studies are required to gain insight into movement patterns of mature coastal lobsters.

## Résumé

Un total de 401 homards femelles ovigères ont été transférés du banc Georges à trois emplacements côtiers le long de la côte sud-ouest de la Nouvelle-Écosse. Du total relâché, 68 (17%) ont été repris dont 66 s'étaient déplacés vers le large en direction de l'endroit de leur prélèvement et avaient été repris à plus de 117 km du site de relâche. Le nombre moyen de jours en liberté était 492 et le nombre maximum 1,526 jours. La distance moyenne parcourue était 144 km. Le plus long trajet en ligne droite était 216 km parcouru par un homard de 118 mm qui avait voyagé de l'île Port Mouton jusqu'au large du plateau continental à l'ouest du banc Browns en 390 jours. Des 68 homards recapturés, 9 (13%) ont été repris une deuxième fois. Les résultats de ce projet en cours indiquent que les homards hauturiers transférés démontrent un mouvement dirigé vers l'endroit d'où ils provenaient. On aurait besoin d'études d'étiquetage additionnelles pour mieux comprendre les mouvements des homards matures côtiers.

## INTRODUCTION

The Canadian offshore lobster fishery exists along the southwestern edge of the Scotian Shelf outside a line approximately 92 km from the coast (Figure 1). The question of whether offshore fishing effort will affect inshore catches, has been important to both researchers and lobster fishermen since the offshore fishery began in 1971. One method of determining the relationship of adult lobsters, is by studying movement through tag and recapture programs.

Recent tagging studies by Pezzack and Duggan (1986 and unpublished data) have shown that lobsters make seasonal long distant round trip migrations from deep to shallow water areas of the Shelf, returning to within a few kilometers from the original capture sites. These migrations may represent a homing tendency to return to specific sections of the Shelf. Other tagging studies by Sails and Flowers (1968), Morrissey (1971), Cooper and Uzmann (1971), Fogarty et al. (1980), Campbell (1986) and Pezzack and Duggan (1986) show that mature lobsters are capable of directed long-distance movement.

The present paper presents the results of a study which displaced berried females from the offshore to coastal waters, to determine whether the lobsters would remain in the new habitat or return to the outer shelf.

## METHODS

A total of 401 berried female lobsters were displaced during late June from Georges Bank (Figure 2) to three coastal locations along the southwestern shore of Nova Scotia (Figure 3). The release sites at Shelburne (1983, 1984, 1986), Port Mouton (1986) and Pubnico Point (1986), were within 1-2 km from shore, in less than 30 m of water and near charted harbour buoys so that accurate locations could be plotted. Two hundred and three lobsters were released in the Shelburne area, 100 in Pubnico and 98 in Port Mouton.

The berried female lobsters were caught in regular offshore lobster traps fished between 164 to 220 meters during commercial fishing on Georges Bank (Figure 2). Claws were immobilized with rubber bands and the lobsters placed in on board tanks containing aerated circulating sea water. Animals were off-loaded in Shelburne, Nova Scotia and checked for damage (missing claws or punctures) and signs of stress (weak). Lobsters in good condition were retained for tagging and the rest were released in port. The lobsters were stored overnight (12-15 hrs.) in a flow-through sea water system at ambient Shelburne harbour temperature. Lobsters were removed from the tanks the following day, checked for weakness and tagged with a sphyron anchor tag (Scarratt and Elson 1965) inserted into the dorsal extensor muscle between the carapace and tail. Carapace length (CL), egg stage and tag number were recorded for each animal before it was placed in an insulated container for transport to the port of release. The insulated box was transferred to an 18 foot boat for transport to the actual release site.

On site, lobsters were checked for condition and attachment of tag, claw bands removed and the lobster placed in the water, taking care that as few as possible of the eggs were lost.

## RESULTS

Sixty-eight (17%) of the 401 lobsters released were returned with detailed location and depth information. Only 2 of the releases were recaptured less than 117 km from original release site (Table 1 and Figures 4, 5, 6), and only 5 within 180 days of release. The greatest straight-line distance moved was 216 km in 390 days recorded for a female released at Port Mouton Island and recaptured on the outer shelf to the west of Browns Bank. The greatest time at large was recorded

for an animal initially recaptured after 736 days and then again after an additional 790 days or 1526 days after original release date. The distance travelled between the release and first recapture was 128.7 km and between first and second recapture only 12.8 km.

Nine of the 68 initial recaptures were recaptured a second time and one a third time. Seven of the double recaptures showed initial return offshore movement (mean=141.7 km), but little movement (mean=11.0 km) between first and second recapture (Figure 7). The lobster recaptured a third time moved only 5.9 km between first and third recapture.

Two of the lobsters recaptured a second time showed movement of >80 km between first and second recapture (Figure 8). One (#55125) was caught on the outer Shelf (145.9 km from release site) to the west of Browns Bank, 488 days after release and travelled 115 km, to the east of Browns Bank (140 km from the initial release site) before it was caught 575 days later. The lobster had hatched eggs, molted and released eggs again at first recapture and had hatched eggs and molted again when caught the second time. Another lobster (#55020), first caught 701 days after release, had moved to the outer Shelf and was recaptured a second time 324 days later to south of Seal Island (16.5 m). The lobster had travelled a distance of 117 km between first and second recapture but had returned to within 21 km of the Nova Scotia coast (62 km from original release site). The lobster had also hatched eggs, molted and released eggs again when first recaptured. These eggs were hatched when the lobster was recaptured the second time.

## DISCUSSION

The results suggest homing or directed movement of the displaced offshore lobsters. The majority of the recaptured lobsters had moved offshore in the direction of original capture sites on Georges Bank. They made long distant movements from the coast to the continental slope, but once on the slope they appear to have moved little. The low inshore return rates suggest that few remained in the coastal region. The results are preliminary, but they support the results of similar studies by Saila and Flowers (1968) and Fogarty et al. (1980) which showed berried female lobsters capable of long-distant return movement after having been displaced from offshore areas.

The tagged lobsters were not exposed to fishing effort for approximately 5 months after release (inshore fishery began in late November) and had time to disperse. Saila and Flowers (1968) showed that while eggs were attached little movement was detected, however once eggs were released greater movement was observed. Lobsters in the present study would have hatched their eggs within 2 months of tagging, and all recaptured lobsters had released eggs.

During the fall to spring periods fishing effort is greater inshore, adjacent to the release sites, than in the offshore areas (Sharp and Duggan 1985). Returns would be expected from inshore areas if lobsters had remained in the shallow inshore waters. Low fishermen cooperation could account for some of the observed low tag return rates from parts of the coast, but the almost complete absence of returns inshore and the relatively high return rates (19%) to date offshore, suggest that a large percentage of the lobsters move quickly offshore. Though the return rate is not as high as observed in recent offshore tagging projects (40-60%), it is higher than previous studies (Campbell and Stasko 1985) in Southwestern Nova Scotia, and are high when the mean distance travelled is considered.

Returns were 50% lower at the Port Mouton release site than from the other two release sites. Lower offshore effort on the Shelf directly adjacent to the South Shore is a possible reason. Higher rates of return might be expected to occur in the future if an offshore 4W fishery becomes active. Lobsters were not caught on Browns Bank (Figure 1), because the Bank is closed to all lobster fishing and any lobster which moved to the Bank would not be caught.

Further tagging studies (inshore and offshore) are required in order to determine the significance of the results of the present study, and to understand the movement patterns of lobsters and potential stock relationships in the Gulf of Maine and on the Scotian Shelf. To fully understand the potential homing instincts of lobsters, animals caught inshore should be tagged and released in the offshore and native coastal lobsters should be tagged to see how their movements differ from the displaced lobsters.

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Table 1: Tag release/ return information for displaced females

|                           | Release Sites                                    |                     |                     |
|---------------------------|--------------------------------------------------|---------------------|---------------------|
|                           | Shelburne(Jig Rock)                              | Pubnico Point       | Port Mouton Island  |
| Date of Release           | June 30-July 5/83<br>June 15-29/84<br>July 03/86 | July 03/86          | July 04/86          |
| Location                  | 43° 41' N 65° 16' W                              | 43° 35' N 65° 48' W | 43° 55' N 65° 45' W |
| Depth (metres)            | 22-27                                            | 13                  | 18                  |
| #Released<br>(Mean CL mm) | 203<br>(123)                                     | 100<br>(116)        | 98<br>(118)         |
| #Returned<br>(Mean CL mm) | 39 (19%)<br>(134)                                | 19 (19%)<br>(134)   | 10 (10%)<br>(125)   |
| Days at Large             |                                                  |                     |                     |
| Mean                      | 582                                              | 328                 | 362                 |
| Min.                      | 164                                              | 145                 | 151                 |
| Max.                      | 1526                                             | 503                 | 446                 |
| Distance Travelled (km)   |                                                  |                     |                     |
| Mean                      | 137                                              | 137                 | 194                 |
| Min.                      | 13                                               | 12                  | 176                 |
| Max.                      | 170                                              | 159                 | 216                 |
| Depth Change (metres)     |                                                  |                     |                     |
| Mean                      | 152                                              | 187                 | 109                 |
| Min.                      | 5                                                | 16                  | -4                  |
| Max.                      | 393                                              | 313                 | 177.                |

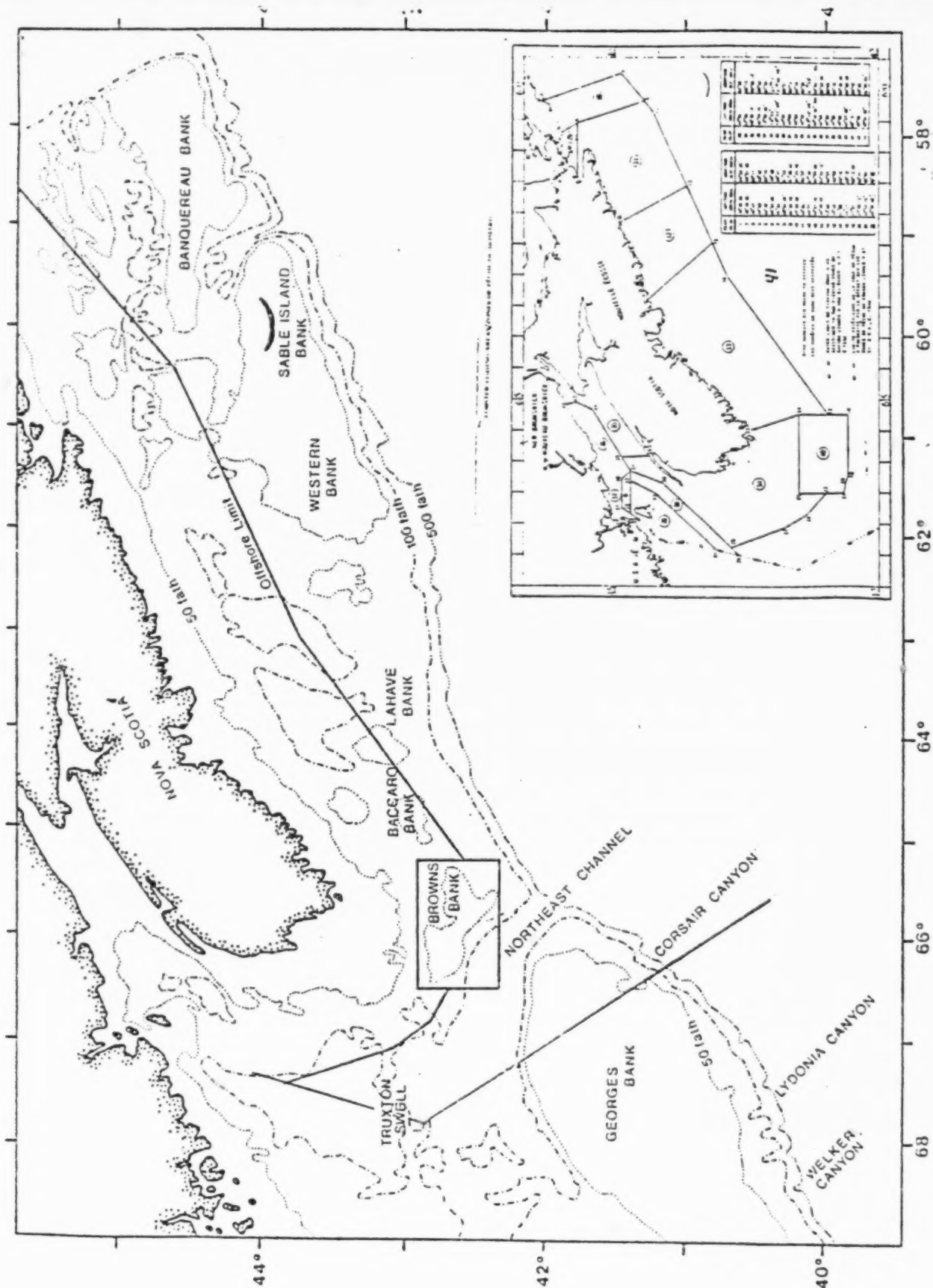


Fig. 1. Offshore Lobster District 41, showing Canadian offshore fishing areas.

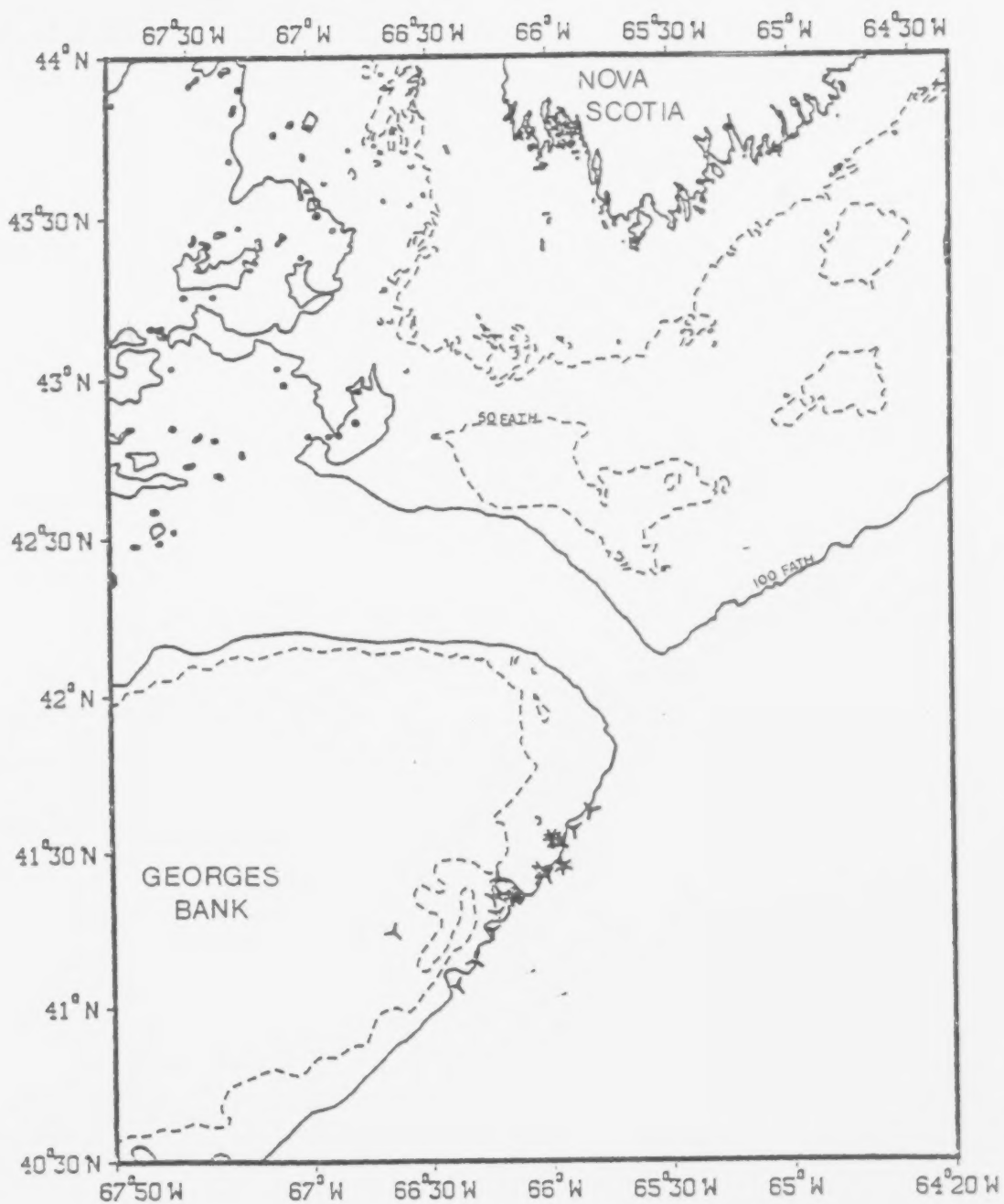


Figure 2: Georges Bank capture sites

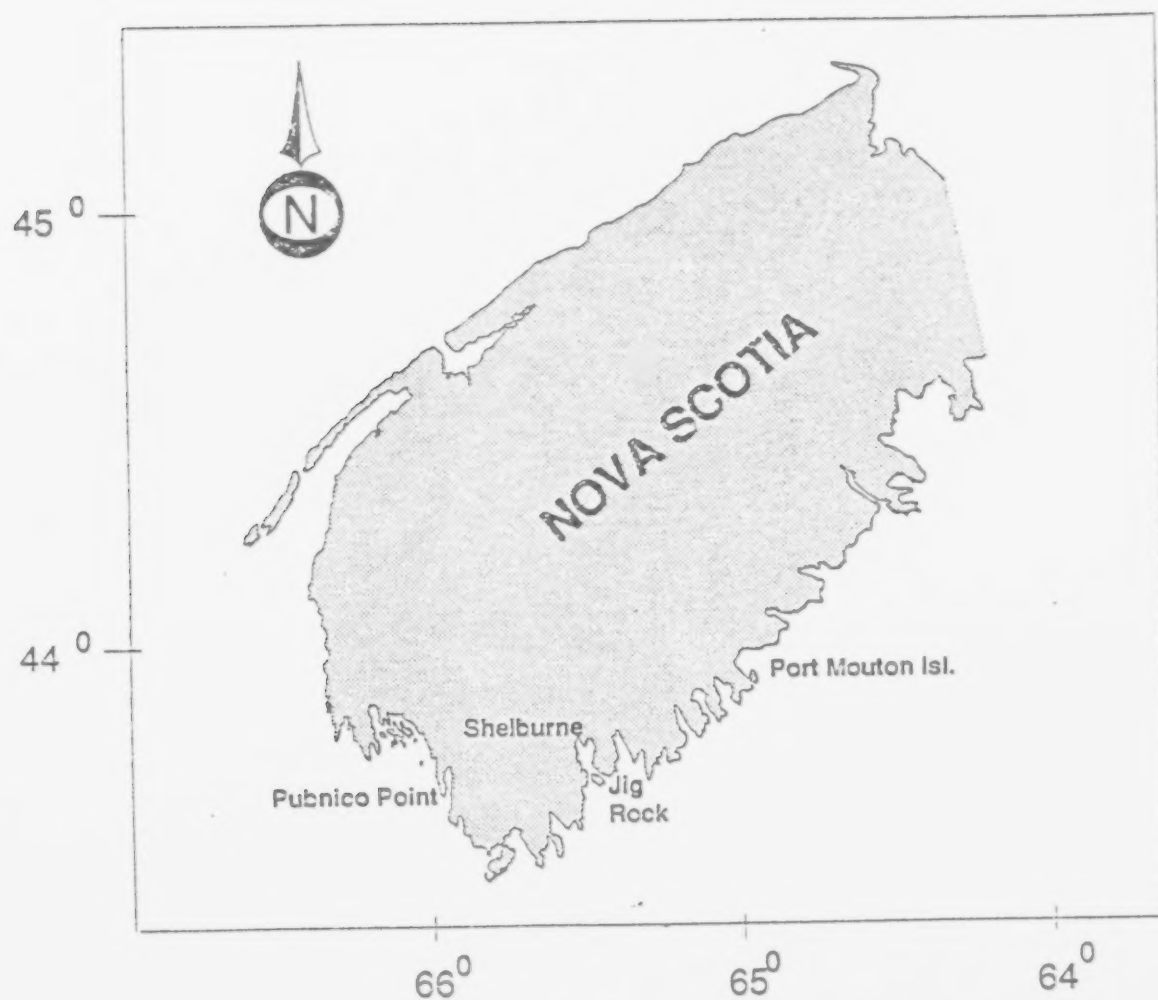


Figure 3: Release sites of tagged lobsters

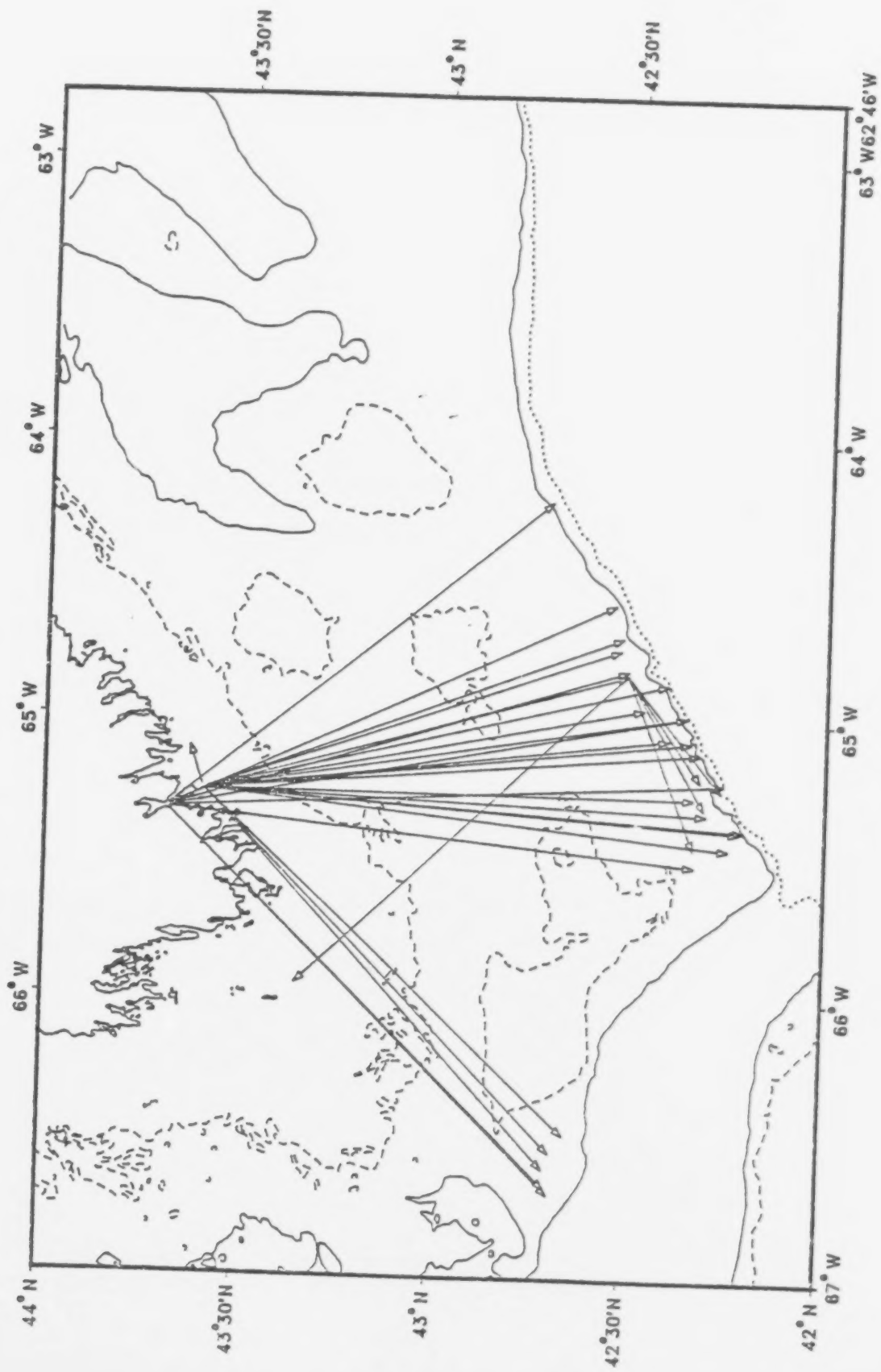


Figure 4: Lobster tag returns ( $\Delta$ ) from Shelburne Harbour and Jig Rock release sites (1983-86)

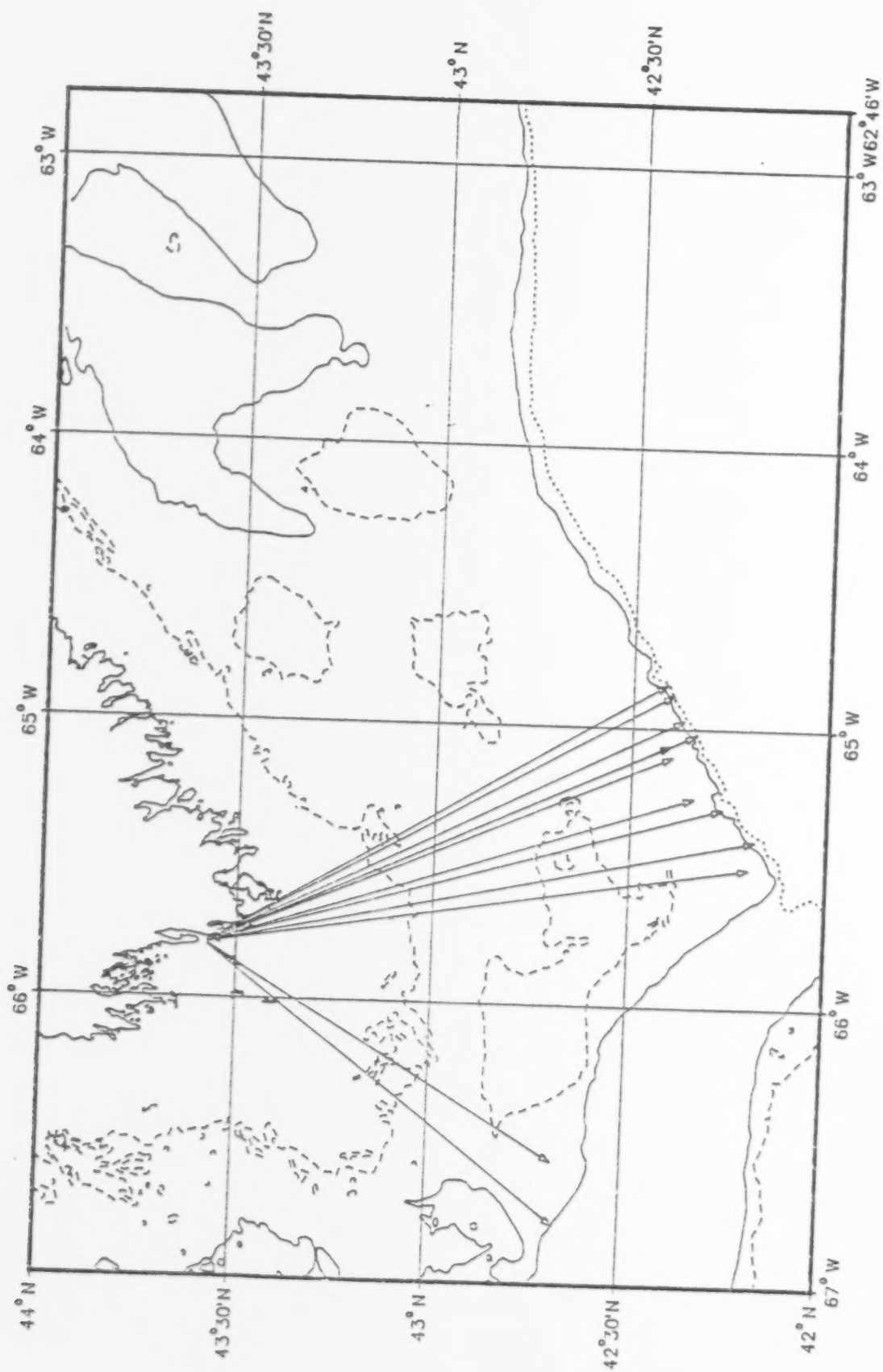


Figure 5: Lobster tag returns ( $\Delta$ ) from Pubnico Point release site (1986)

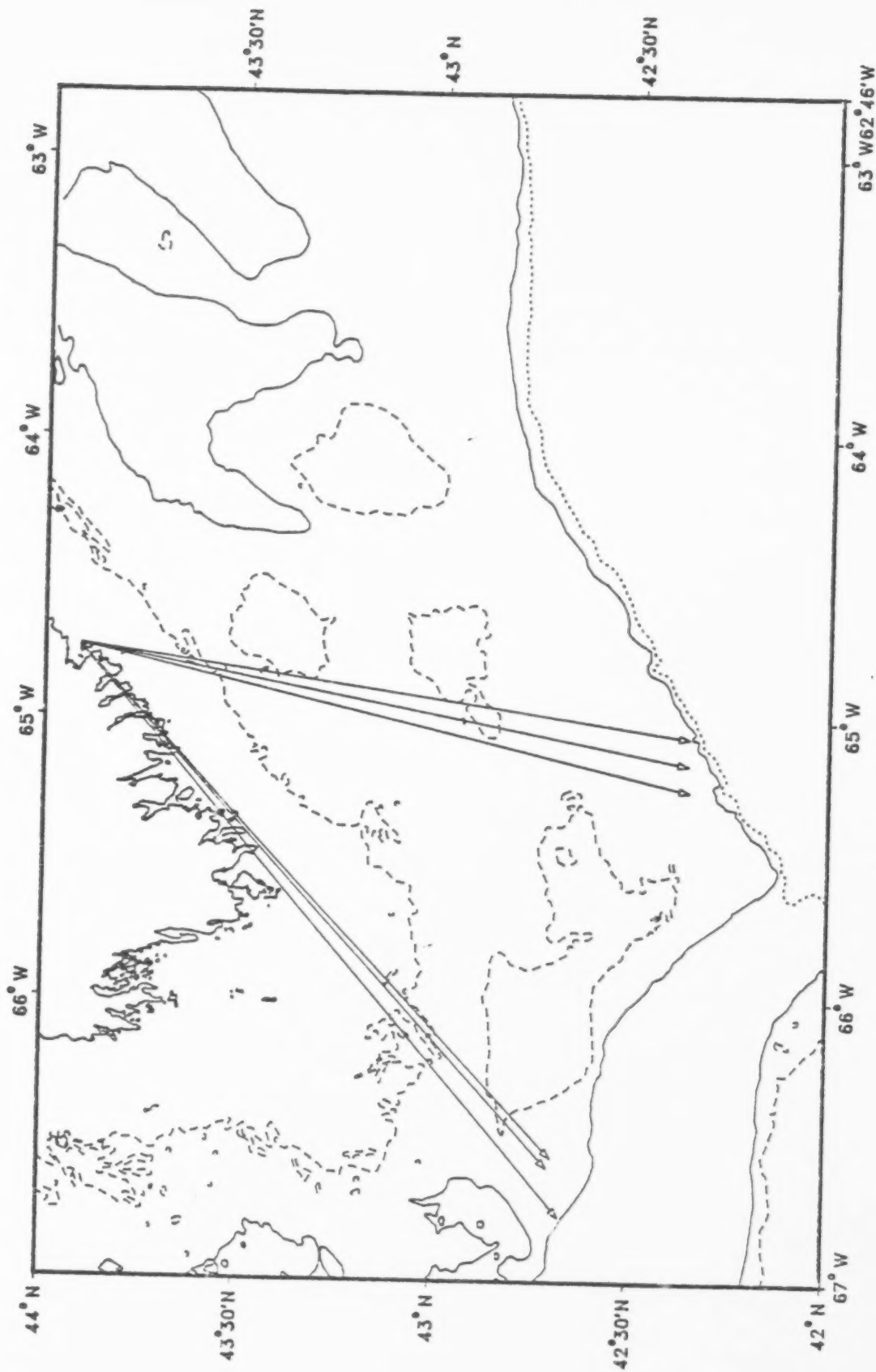


Figure 6: Lobster tag returns ( $\Delta$ ) from Port Mouton Island release site (1986)

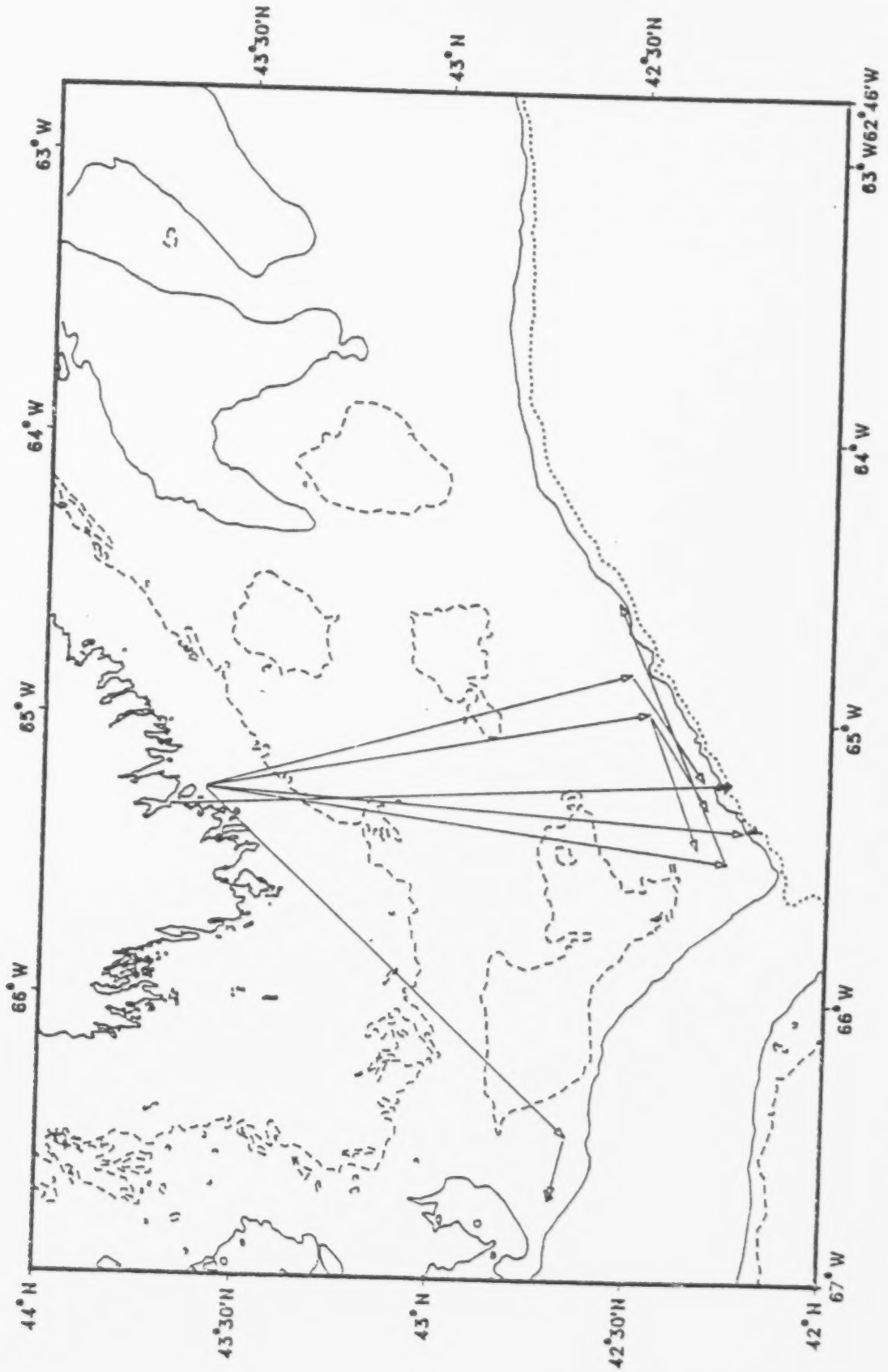


Figure 7: Lobster tag returns ( $\Delta$ ) with multiple recaptures

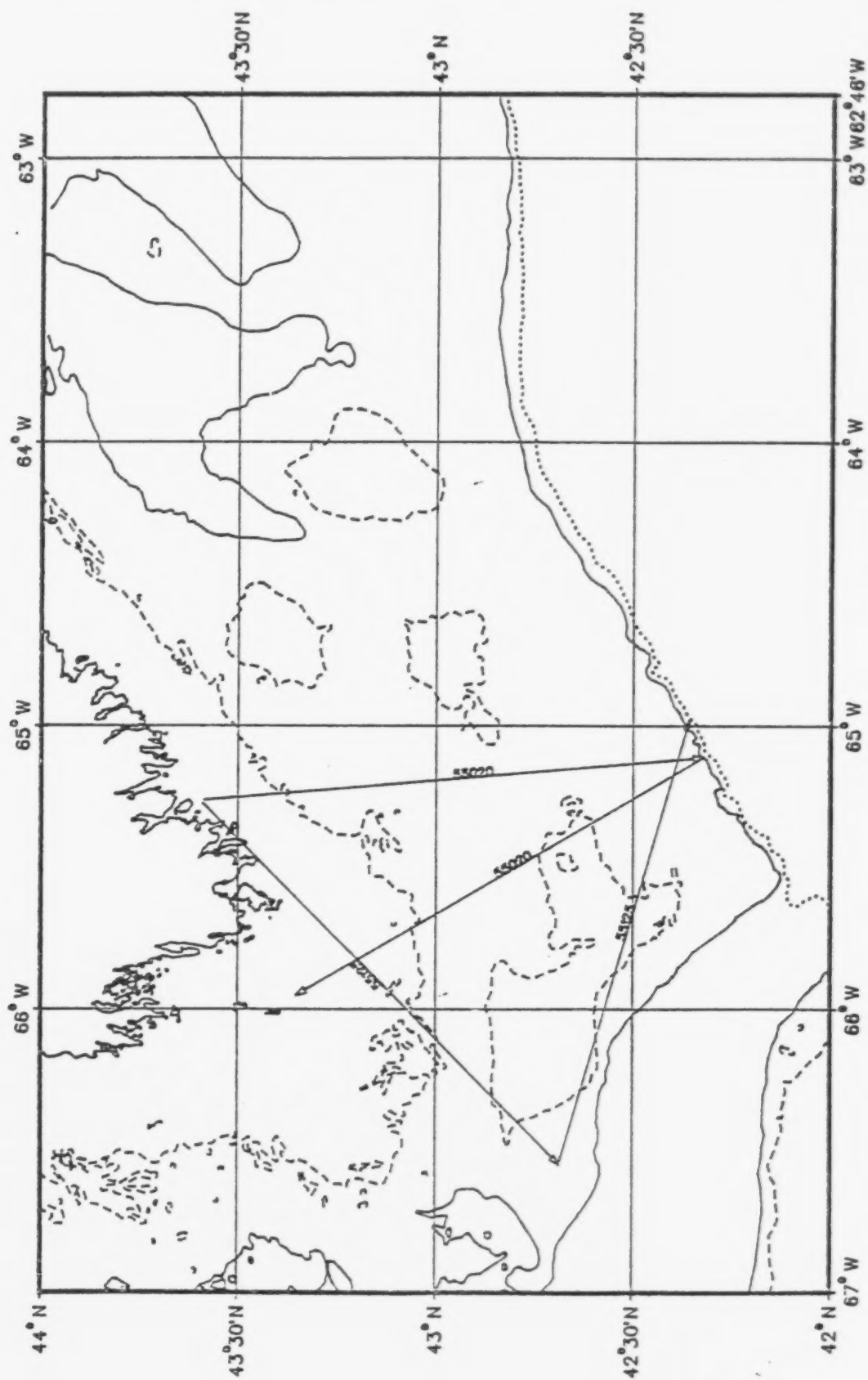


Figure 8: Lobster tag returns ( $\Delta$ ) with multiple recaptures

